

PAOLO SERRA, PH.D.

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Summary

- Citizenship: Italian (Lawful Permanent Resident of the United States)
- Ph.D in Astronomy, with particular focus on the analysis and theoretical interpretation of cosmological data sets.
- Co-author of 50+ scientific publications with 3000+ citations in top journals (including *Astronomy & Astrophysics*, *Astrophysical Journal*, *Astrophysical Journal Letters*, *Nature*, *Physical Review D*, *Physical Review Letters*).
- Fluent in Italian (mother tongue), English, French
- Programming skills: Python, Fortran 77/90, IDL

Career and Education

- [08/2015-] NASA Senior Postdoctoral Fellow, **Jet Propulsion Laboratory (JPL)**, NASA/Caltech, Pasadena, CA, USA
- [10/2013-08/2015] Postdoctoral Researcher, **Centre National d'Etudes Spatiales (CNES)**, Paris, France
- [10/2011-09/2013] Ingénieur de Recherche, **Centre National de la Recherche Scientifique (CNRS)**, Paris, France
- [09/2010-09/2011] Research Scientist, **NASA-Ames Research Center**, Mountain View, CA, USA.
- [11/2007-08/2010] Postdoctoral Scholar, **University of California, Irvine**, USA.
- [10/2004-10/2007] Ph.D. in Astronomy, **University of Rome "La Sapienza"**.
Thesis title: *Constraints on cosmological parameters from a combined analysis of Cosmic Microwave Background Radiation and Large Scale Structures*.
- [09/1998-09/2004] Master of Science in Physics, **University of Rome "La Sapienza"**, graded 110/110.
- [09/1993-07/1998] Classical Lyceum graduation with full mark (60/60), Liceo Classico Statale "Orazio", Rome, Italy.

Research interests

- Theoretical cosmology and extragalactic astrophysics
- Physics of the submm/far-infrared extragalactic background (Cosmic Microwave Background, Cosmic Infrared Background)
- Physics and probes of large scale structures
- Physics and probes of reionization
- Statistical methods in cosmology, Bayesian analysis, Monte Carlo Markov Chains algorithms

Professional activities

- Referee for *Monthly Notices of the Royal Astronomical Society* and *Astrophysical Journal Letters*
- Invited reviewer for NASA Astrophysics Data Analysis (ADAP) Panel 2013 and 2015
- Co-developer of the publicly available Markov Chain Monte Carlo package for astrophysical data analysis Cigale (<http://cigale.oamp.fr/>)
- Co-supervisor of graduate and undergraduate students (Francesco de Bernardis, Stefania Pandolfi, Federico Zalamea)

Selected Talks

- [February 2016] “*Cosmic Infrared Background Anisotropies with Planck, Herschel, and Other Sub-millimeter Surveys*”, JPL 2016 Astrophysics Colloquia and Seminars
- [December 2014] “*Cosmic star formation history and Sunyaev-Zeldovich effect from a global analysis of CIB anisotropies*”, talk given at PLANCK 2014 - The microwave sky in temperature and polarization”, Ferrara, Palazzo Costabili, Italy, 1-5 December 2014
- [September 2013] “*Constraints on the cosmic star formation history from the analysis of cosmic infrared background anisotropies with Planck*”, talk given at “Galaxy evolution over five decades”, Cavendish Astrophysics, University of Cambridge, U.K., 3-6 September, 2013
- [October 2012] “*State of the art in Cosmic Infrared Background Anisotropies modeling: a critical review*”, invited lecture given at “Banyuls 2012: Deciphering the Cosmic Infrared Background”, Banyuls, October 8-12, 2012
- [July 2012] “*Cross-correlations of Cosmic Infrared Background and Large Scale Structures: constraints on clustering and star formation history*”, invited talk at IAS-Orsay, July 19 2012.
- [March 2010] “*Cosmological constraints on dark energy and modified gravity*”, “45th Rencontres de Moriond”, La Thuile, Italy - March 13-20, 2010.
- [July 2009] “*Temporal constraints on the dynamics of dark energy*”, “SF09 Cosmology Summer Workshop”, Santa Fe, July 13-19, 2009.
- [March 2009] “*Cosmological constraints on post-General Relativity parameters*”, “GGI Conference on dark energy”, invited talk given at the Galileo Galilei Institute for Theoretical Physics, Florence, Italy -March 2-9, 2009 .
- [December 2008] “*Clustered point sources and the CMB*”, 24th Texas Symposium on Relativistic Astrophysics, Vancouver, December 8-12, 2008.
- [May 2007] “*Dark energy in the Bayesian framework*”, invited talk at the Astronomy Centre, University of Sussex
- [September 2006] “*Massive neutrinos and their impact on cosmology*”, “Now 2006, Neutrino Oscillation Workshop”, Otranto, Lecce September 9-16, 2006
- [March 2006] “*Weighing neutrinos with cosmology*”, “ 41th Rencontres de Moriond”, La Thuile, Italy - March 18-25, 2006.

Collaborations

- [2011-present] Core team member, ESA’s Planck satellite High Frequency Instrument
- [2009-2011] Member of the ESA’s Herschel Survey collaboration, consultant for Herschel-ATLAS

Achievements and Fellowships

- [2015] NASA Senior NPP Fellowship
- [2014] CO-I, NASA Astrophysics Data Analysis Program, *Extragalactic Backgrounds after Planck* (declined)
- [2007-2008] Fellowship from the Department of Physics, University of Rome “La Sapienza”
- [2007-2008] “Della Riccia” Fellowship for studies in nuclear and sub-nuclear physics
- [1998-2003] A.Di.S.U. fellowship for academic merits

Publications of Paolo Serra

- [1] G.L. Fogli, E. Lisi, A. Marrone, A. Melchiorri, A. Palazzo, **P. Serra**, J. Silk “*Observables sensitive to absolute neutrino masses: Constraints and correlations from world neutrino data*”, Phys. Rev. D **70** (2004) 113003
- [2] A. Melchiorri, T. Roy Choudhury, **P. Serra**, A. Ferrara “*A very extended reionization epoch ?*”, Mon. Not. Roy. Astron. Soc. **364** (2005) 873-878
- [3] A. Melchiorri, G.L. Fogli, E. Lisi, A. Marrone, A. Palazzo, **P. Serra**, J. I. Silk “*Constraints on the Sum of Neutrino Masses from Cosmology and their impact on world neutrino data*”, Nuclear Physics B Supplement, **145**, p. 290-294, 2005 .
- [4] G. Mangano, A. Melchiorri, **P. Serra**, A. Cooray, M. Kamionkowski “*Cosmological bounds on dark matter-neutrino interactions*”, Phys. Rev. D **74** (2006) 043517
- [5] G.L. Fogli, E. Lisi, A. Marrone, A. Melchiorri, A. Palazzo, **P. Serra**, J. Silk, A. Slosar “*Observables sensitive to absolute neutrino masses: A reappraisal after WMAP-3y and first MINOS results*”, Phys. Rev. D **75** (2007) 053001
- [6] A. De La Macorra, A. Melchiorri, **P. Serra**, R. Bean “*The impact of neutrino masses on the determination of dark energy properties*”, Astroparticle Physics **27** (2007) 406-410
- [7] **P. Serra**, R. Bean, A. De La Macorra, A. Melchiorri, *Massive neutrinos and dark energy*, Nucl. Phys. Proc. Suppl. **168** :31-33, 2007
- [8] A. Melchiorri, B. Paciello, **P. Serra**, A. Slosar “*Constraints on Dynamical Dark Energy:an update*”, New J. Phys. **325**, 2006.
- [9] A. Melchiorri, S. Dodelson, **P. Serra**, A. Slosar, “*New constraints on Neutrino Physics from Cosmology*”, New Astronomy Reviews, Volume 50 (2006) Pages 1020-1024
- [10] **P. Serra**, A. Heavens, A. Melchiorri “*Bayesian Evidence for a Cosmological Constant using new High-Redshift Supernovae Data*”, MNRAS, **379**: 1-169, 2007
- [11] A. Melchiorri, C. Odman, **P. Serra**, “*Constraints on Cosmological Parameters from CMB*”, Published in Lect. Notes Phys. **665**: 237-259, 2009
- [12] G.L. Fogli, E. Lisi, A. Marrone, A. Melchiorri, A. Palazzo, A.M. Rotunno, **P. Serra**, J. Silk, A. Slosar “*Observables sensitive to absolute neutrino masses. II* ”, Phys. Rev. D **78** (2008) 033010
- [13] **P. Serra**, A. Cooray “*Impact of Secondary non-Gaussianities on the Search for Primordial Non-Gaussianity with CMB Maps*”, Phys. Rev. D **77**, 107305 (2008)
- [14] T. D. Kitching, A. F. Heavens, L. Verde, **P. Serra**, A. Melchiorri “*Finding Evidence for Massive Neutrinos using 3D Weak Lensing* ”, Phys. Rev. D **77**, (2008) 103008
- [15] D. Sarkar, **P. Serra**, A. Cooray, K. Ichiki, D. Baumann “*Cosmic Shear from Scalar-Induced Gravitational Waves*”, Phys. Rev. D **77**, (2008) 103515
- [16] A. Melchiorri, **P. Serra** “*Anisotropies in the neutrino background: An update*” Phys. Rev. D. **74**. 127301
- [17] A. Cooray, D. Sarkar, **P. Serra** “*Weak Lensing of the Primary CMB Bispectrum*”, Phys. Rev. D. **77**, (2008) 123006
- [18] **P. Serra**, A. Cooray, A. Amblard, L. Pagano, A. Melchiorri “*Impact of Point Source Clustering on Cosmological Parameters with CMB Anisotropies*”, Phys. Rev. D **78**, (2008) 043004
- [19] F. De Bernardis, **P. Serra**, A. Cooray, A. Melchiorri “*An improved limit on the neutrino mass with CMB and redshift-dependent halo bias-mass relations from SDSS, DEEP2, and Lyman-Break Galaxies*”, Phys. Rev. D **78**, 083535 (2008)
- [20] **P. Serra**, A. Cooray, S. F. Daniel, R. Caldwell, A. Melchiorri “*Lensed Cosmic Microwave Background Constraints on Post-General Relativity Parameters*”, Phys. Rev. D **79**, 101301 (R) (2009)
- [21] S. F. Daniel, R. R. Caldwell, A. Cooray, **P. Serra**, A. Melchiorri “*A Multi-Parameter Investigation of Gravitational Slip*”, Phys. Rev. D. **80**, 023532 (2009)
- [22] M. Veneziani *et al.*, “*Sub-Degree Sunyaev-Zel'dovich Signal from Multi-Frequency BOOMERanG observations*”, (Boomerang Collaboration), [arXiv:astro-ph 0904.4313], Astrophys. J. **702**: L61-L65, 2009
- [23] J. Smidt, A. Amblard, **P. Serra**, A. Cooray “*Measurement of Primordial Non-Gaussianity Using WMAP 5-Year Temperature Skewness Power Spectrum* ”, Phys. Rev. D **80**, 123005 (2009)
- [24] **P. Serra**, A. Cooray, D. E. Holz, A. Melchiorri, S. Pandolfi, D. Sarkar, “*No Evidence for Dark Energy Dynamics from a Global Analysis of Cosmological Data*”, Phys. Rev. D **80**: 121302, 2009

- [25] E. Calabrese, J. Smidt, A. Amblard, A. Cooray, A. Melchiorri, **P. Serra**, A. Heavens, D. Munshi “*Non-Gaussianity in WMAP Data Due to the Correlation of CMB Lensing Potential with Secondary Anisotropies*”, Phys. Rev. D, **81**, 043529 (2010)
- [26] J. Smidt, S. Joudaki, **P. Serra**, A. Amblard, A. Cooray “*Impact of Secondary non-Gaussianities in the CMB on Cosmological Parameter Estimation*”, Phys. Rev. D **81**, 123528 (2010)
- [27] D. Munshi, A. Heavens, A. Cooray, J. Smidt, P. Coles, **P. Serra** “*New Optimised Estimators for the Primordial Trispectrum*”, Mon. Not. Roy. Astron. Soc. **412**: 1993, 2011
- [28] **P. Serra**, F. Zalamea, A. Cooray, G. Mangano, A. Melchiorri, “*Constraints on neutrino – dark matter interactions from cosmic microwave background and large scale structure data*”, Phys. Rev. D **81**, 043507 (2010)
- [29] J. Smidt, A. Amblard, A. Cooray, A. Heavens, D. Munshi, **P. Serra**, “*A Measurement of Cubic-Order Primordial Non-Gaussianity g_{NL} and τ_{NL} With WMAP 5-Year Data*”, [arXiv:1001.5026], submitted to PRD
- [30] S. Pandolfi, A. Cooray, E. Giusarma, E. W. Kolb, A. Melchiorri, O. Mena, **P. Serra**, “*Harrison-Z’eldovich primordial spectrum is consistent with observations*”, Phys. Rev. D **81**, 123509 (2010)
- [31] F. De Bernardis, **P. Serra**, A. Cooray, A. Melchiorri, “*Constraints on primordial non-Gaussianity from WMAP7 and Luminous Red Galaxies power spectrum and forecast for future surveys*”, Phys. Rev. D **82**, 083511, (2010)
- [32] A. Amblard et al., “*Herschel-ATLAS: Dust temperature and redshift distribution of SPIRE and PACS detected sources using submillimetre colours*”, [arXiv:1005.2412], accepted for publication in A&A Special Issue on Herschel First Science Results (July 2010).
- [33] A. Cooray et al., “*HerMES: Halo Occupation Number and Bias Properties of Dusty Galaxies from Angular Clustering Measurements*”, [arXiv:1005.3303], accepted for publication in A&A Special Issue on Herschel First Science Results (July 2010).
- [34] A. Cooray et al., “*The Herschel-SPIRE Legacy Survey (HSLS): the scientific goals of a shallow and wide submillimeter imaging survey with SPIRE*”, [arXiv:astro-ph/1007.3519].
- [35] A. Amblard, A. Cooray, **P. Serra** et al., “*Sub-millimetre galaxies reside in dark matter halos with masses greater than $3 \times 10^{11} M_{\text{sun}}$* ”, Nature **470**, 510, 2011
- [36] L. Wang et al., “*HerMES: detection of cosmic magnification of sub-mm galaxies using angular cross-correlation*”, MNRAS **414**: 596-601, 2011
- [37] L. Levenson et al., “*HerMES: SPIRE Science Demonstration Phase Maps*”, MNRAS **409**: 83-91, 2010
- [38] S. Pandolfi, E. Giusarma, E. W. Kolb, M. Lattanzi, A. Melchiorri, O. Mena, M. Pena, A. Cooray, **P. Serra**, “*Impact of general reionization scenarios on extraction of inflationary parameters*”, Phys. Rev. D **82**:123527, 2010
- [39] J. Smidt, A. Cooray, A. Amblard, S. Joudaki, D. Munshi, M. G. Santos, **P. Serra** “*A Constraint On the Integrated Mass Power Spectrum out to $z = 1100$ from Lensing of the Cosmic Microwave Background*”, ApJL **728**, Issue 1, L1 (2011)
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- [41] M. Archidiacono, F. De Bernardis, A. Cooray, A. Amblard, **P. Serra**, A. Melchiorri, *Amplitudes of thermal and kinetic Sunyaev-Zel’dovich signals from small-scale CMB anisotropies*, Phys. Rev. D **85**, 043015 (2012)
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- [44] A. Conley et al. *Discovery of a Multiply-Lensed Submillimeter Galaxy in Early HerMES Herschel/SPIRE Data*, ApJ, 732, L35 (2011)
- [45] R. Gavazzi et al. *Modeling of the HERMES J105751.1+573027 submillimeter source lensed by a dark matter dominated foreground group of galaxies*, ApJ 738, Issue 2, Id.125 (2011)
- [46] M. Blennow, E. Fernandez Martinez, O. Mena, J. Redondo, **P. Serra**, *Asymmetric dark matter and dark radiation*, JCAP Issue 07 (2012) 022
- [47] Planck Collaboration, *Planck 2013 results. I. Overview of products and scientific results*, A&A, **571** (2014) A1
- [48] Planck Collaboration, *Planck 2013 results. XVIII. Gravitational lensing-infrared background correlation*, A&A, **571** (2014) A18
- [49] M. P. Viero et al., *HerMES: The Contribution to the Cosmic Infrared Background from Galaxies Selected by Mass and Redshift*, ApJ **779** 32 (2013)
- [50] Planck Collaboration, *Planck 2013 results. XXX. Cosmic infrared background measurements and implications for star formation*, A&A, **571** (2014) A30

- [51] A. Amblard, L. Riguccini, P. Temi, S. Im, M. Fanelli, **P. Serra**, *Star-Formation Bimodality in Early-Type Galaxies*, ApJ **783**, 135 (2014)
- [52] **P. Serra**, G. Lagache, O. Doré, A. Pullen, M. White, *Cross-correlation of Cosmic Infrared Background Anisotropies with Large Scale Structures*, A&A **570**, A98 (2014)
- [53] Planck Collaboration, *Planck 2015 results. I. Overview of products and scientific results*, A&A, **594**, A1 (2016)
- [54] Planck Collaboration, *Planck 2015 results. XI. CMB power spectra, likelihoods, and robustness of parameters*, A&A, **594**, A11 (2016)
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- [56] Planck Collaboration, *Planck intermediate results. XXXVIII. E- and B-modes of dust polarization from the magnetized filamentary structure of the interstellar medium*, A&A **586**, A141 (2016)
- [57] N. Welikala *et al.*, *Probing star formation in the dense environments of z 1 lensing halos aligned with dusty star-forming galaxies detected with the South Pole Telescope*, MNRAS, **455**: 1629-1646, 2016
- [58] **P. Serra**, O. Doré, G. Lagache, *Dissecting the high- z interstellar medium through intensity mapping cross-correlations*, submitted to ApJL, [arXiv:1608.00585]